Weiwei Zhang*, Dirk Geeraerts and Dirk Speelman

Visualizing onomasiological change: Diachronic variation in metonymic patterns for WOMAN in Chinese

Abstract: This paper introduces an innovative method to aid the study of conceptual onomasiological research, with a specific emphasis on diachronic variation in the metonymic patterns with which a target concept is expressed. We illustrate how the method is applied to explore and visualize such diachronic changes by means of a case study on the metonymic patterns for WOMAN in the history of Chinese. Visualization is done with the help of a Multidimensional Scaling solution based on the profile-based distance calculation (Geeraerts et al. 1999; Speelman et al. 2003) and by drawing diachronic trajectories in a set of MDS maps, corresponding to different metonymic targets. This method proves to be effective and feasible in detecting changes in the distribution of metonymic patterns in authentic historical corpus data. On the basis of this method, we can show that different targets exhibit different degrees of diachronic variation in their metonymic patterns. We find diachronically more stable targets (e.g. IMPERIAL WOMAN), targets with a dominant trend in diachronic variation (e.g. A WOMAN), and targets with highly fluctuating historical variation (e.g. BEAUTIFUL WOMAN). Importantly, we can identify the cultural and social changes that may lie behind some of these changes. Examining the results uncovered by the method offers us a better understanding of the dynamicity of metonymic conceptualizations.

Keywords: metonymy, conceptual onomasiological variation, historical corpus, multidimensional scaling, visualization

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***Corresponding author: Weiwei Zhang,** Institute of Linguistics, Shanghai International Studies University, Shanghai, China; Research Unit of Quantitative Lexicology and Variational Linguistics, Department of Linguistics, University of Leuven, Leuven, Belgium, E-mail: weiwei.zhang@shisu.edu.cn
Dirk Geeraerts: E-mail: dirk.geeraerts@arts.kuleuven.be, **Dirk Speelman:** E-mail: dirk.speelman@arts.kuleuven.be, Research Unit of Quantitative Lexicology and Variational Linguistics, Department of Linguistics, University of Leuven, Leuven, Belgium

1 Introduction

For studying the relationship between words and their semantic values, we can distinguish between two main perspectives, i.e. a semasiological and an onomasiological one (Geeraerts et al. 1994: 5). If we extrapolate this distinction to metonymy research, the semasiological perspective on metonymy emphasizes the important role of metonymy in semantic change, i.e. the idea that the development of a certain meaning may be triggered by a metonymic process (e.g. Nerlich and Clarke 2001; Traugott and Dasher 2001; Taylor 2003; Koch 2004; Hilpert 2007; Paradis 2011). While this semasiological perspective currently constitutes the main focus of metonymy research in cognitive semantics, an onomasiological perspective in the study of metonymy is at least as important from a cognitive linguistic point of view, because the choice of a metonymic pattern imposes a specific perspective on how a target is viewed (Barcelona 2011: 13): given a referent, what conceptual categories might be chosen as metonymic sources for that referent? In a diachronic setting, onomasiological studies of this kind help to discover the different conceptual or lexical "pathways" through which a concept or a group of concepts has been designated in the course of time (Blank 2001: 7). For example, in a series of studies Kleparski and his colleagues (Kleparski 1996, Kleparski 1997, Kleparski 2000, Kleparski 2004, and Kleparski 2005; Grygiel 2005, Grygiel 2006, Grygiel 2007, and Grygiel 2008; Kleparski and Borkowska 2007; Rusinek 2008a, Rusinek 2008b) have explored how a number of historical synonyms for MAN and WOMAN in English disappeared or changed their meaning, with a specific focus on the onomasiological role of metaphor and metonymy in that process. The present study is similar, in the sense that we will focus on the changing role of metonymy in the diachronic development of the concept WOMAN in Chinese, but we intend to take a methodological step beyond the approach illustrated by Kleparski (1997, 2000, 2004), by introducing advanced forms of quantitative analysis. By way of introduction, we will now situate both aspects of this approach – the diachronic perspective and the quantitative method – in a broader context.

The diachronic perspective is triggered by the recognition that the experientialist nature of language and cognition (a cornerstone of Cognitive Linguistics) involves not just the physiologically embodied but also the cultural and historical "situatedness" of human experience, i.e. "both cultural and historical factors are likely to influence our cognitive patterns" (Geeraerts and Grondelaers 1995: 227). In consequence, if we want to examine metonymy from a real usage-based perspective, we should also add a diachronic dimension to

metonymy research, by exploring the distribution of metonymies amid historically changing environments. The diachronic hypothesis is that changes in culture and society through time could modify the use of metonymies.

The important role of cultural-historical change in people's conceptualization has in fact been frequently attested by a number of metaphor studies (e.g. Sweetser 1991; Geeraerts and Grondelaers 1995; Kay 2000; Gevaert 2002, Gevaert 2005, and Gevaert 2007; Tissari 2003; Musolff 2004; Kövecses 2005; Allan 2006; Koivisto-Alanko and Tissari 2006; Mischler III 2009; Mischler and Jolly 2008; Fabiszak and Hebda 2010; Tissari 2010; Trim 2010 and Trim 2011; Benczes 2011; Geeraerts et al. 2011). Most of them have explored a conceptual metaphor or a subject matter with an expectedly high proportion of metaphors, such as emotions. The historical approach on metaphor has provided substantial evidence for the cultural interpretation of observed metaphor variation.

Diachronic variation in metonymy has not been studied as much as metaphorical variation, with the exception of a series of studies by Allan (2008, 2010). Allan (2008) presents a diachronic approach to uncover the way in which English lexical items for the concept groups of INTELLIGENCE, SENSES, DENSITY and ANIMALS have occurred over time via metaphorical and metonymic mappings. Then, Allan (2010) traces the historical sense development of a group of lexemes related to a particular conventionalized metonymy, i.e. MATERIAL FOR OBJECT (e.g. *glass* for "vessel"), with a special focus on the results of metonymically motivated change and the historical evidence for the way in which the change has arisen over time. She points out that the historical development of metonymic polysemy might be specific to particular word histories and sensitive to both intra-linguistic systemic factors and extra-linguistic factors, e.g. their cultural and historical contexts. Allan's studies strongly support the view that "a diachronic perspective can be helpful and valuable in formulating and testing theories of metonymy" (Allan 2010: 163). In addition, Blank and Koch (1999), Nerlich and Clarke (2001) and Koch (2004) have explored the historical aspects of metonymy, but primarily from the semasiological perspective.

The adoption of a quantitative methodology is motivated by a contextualized, pragmatic interpretation of onomasiology (Grondelaers and Geeraerts 2003: 69–70), i.e. a usage-based approach that focuses on the actual choices made for a particular name as a designation of a particular concept. The variables determining such choices include social and historical factors, and this in turn implies the "adoption of the quantitative, empirical methodology that is dominant in sociolinguistic research at large" (Geeraerts 2006: 31). In the recent practice of Cognitive Linguistics, a range of quantitative techniques have been employed for exploring the variation in linguistic categorization (see Glynn

and Fischer 2010; Janda 2013). In particular, in order to find out the changes in massive data and the factors that may motivate the variation in language usage, multivariate statistical methods have been used successfully by many scholars. Arppe (2008) presents an overall methodological framework for studying lexical variation proceeding from univariate via bivariate to multivariate techniques. Multivariate techniques also prove to be helpful for detecting social-lectal variation, see Levshina (2011), Ruette (2012), Zhang et al. (2011), Zenner et al. (2012, 2013), etc. For diachronic variation, Hilpert (2011) proposes a way of visualizing historical changes in semantics with the help of motion charts. His approach contributes greatly to a diachronic investigation of semantic change from a semasiological perspective, but still leaves open the question of how to visualize the onomasiological change. In that respect, the approach presented in this paper is complementary with regard to Hilpert's representation of diachronic semantic pathways: we intend to show how the repertoire for visualizing semantic changes can be completed with an onomasiological type of representation.

In other words, if the historical onomasiological variation in metonymy cannot feasibly be described without authentic data from large corpora and multivariate statistical techniques, it is important for researchers interested in conceptual onomasiological variation across time to develop improved tools for investigating historical authentic data and unraveling the changes in big data. In this perspective, the present paper introduces a new visualization method for detecting onomasiological variation across time in a large corpus-based dataset by starting from profiles of competing construals. The technique is introduced by means of a case study on the metonymic patterns for WOMAN in the history of Chinese, and as such, it primarily contributes to the methodology of conceptual onomasiological research and diachronic semantics research (cf. Winters et al. 2010; Allan and Robinson 2011). The approach can however be transferred to other contexts for investigating complex linguistic developments.

2 Metonymies for WOMAN: data selection and classification

In this section we will present the selection of the data in our case study of metonymic patterns for WOMAN. This will be followed by a detailed illustration of the visualization technique in Section 3, and in Section 4, we discuss the results detected by the method.

2.1 Data resources

In total, 287 expressions which *may* metonymically refer to feminine targets were collected from two Chinese metonymy dictionaries, i.e. the *Dictionary of Chinese Metonymic Senses* (DCMS) (Han 1995) and the *Dictionary of Chinese Substitutive Words* (DCSW) (Zhang 1993). Then, these metonymy candidates were compared against a historical corpus of Chinese for examining their distributions in real language usage.

The corpus used in this study is the *Corpus of Historical Chinese* (CHC)[1] developed by Peking University. The CHC comprises 17 million characters of classical texts in Chinese, covering a time period from the eleventh century B.C. to the early twentieth century and including varying genres ranging from fiction, poems, academic prose, religious scriptures, to historical works, etc. The corpus provides us with the chronological periods for most texts. As is customary in the study of Chinese history, the periodization refers to the successive dynasties of emperors. Table 1 lists the general chronological information from the CHC. Due to the low frequency of the data for certain dynasties, the variable `Time` was conflated into seven general dynasty groups.

Table 1: Seven conflated time periods in the present study.

Time	Dynasty	Chronological period
01PrQH	Zhou Dynasty	1046 BC–256 BC
	Spring and Autumn Period	770 BC–476 BC
	Warring States Period	476 BC–221 BC
	Western Han Dynasty	206 BC–9
	Eastern Han Dynasty	25–220
02STF	Six Dynasties Period	220–581
	Sui Dynasty	581–618
	Tang Dynasty	618–907
	Five Dynasties Period	907–979
03Song	Northern Song Dynasty	960–1127
	Southern Song Dynasty	1127–1279
04Yuan	Yuan Dynasty	1271–1368
05Ming	Ming Dynasty	1368–1644
06Qing	Qing Dynasty	1644–1912
07RC	Republic of China	1912–1949

1 The corpus can be accessed at http://ccl.pku.edu.cn:8080/ccl_corpus/ (last access on November 15, 2009).

Observations with possible metonymies ("source expressions") were extracted from the corpus in an automated way, i.e. we built a concordance on the basis of the potentially metonymic expressions culled from the dictionaries. Then, the data were cleaned in two steps. First, spurious hits were deleted. The CHC is without word segmentation; hence the keyword search might return many errors. Second, a number of hits are duplicated due to the fact that some texts are included more than once in the CHC. Most of Li Bai's poems, for instance, are repeatedly included in anthologies of *The Complete Poetry of Tang*, *Anthology of Li Bai's Poems* and *The 300 Tang Poems*, which are all included in the CHC. Besides, such repetition also happens when both the original and reprinted versions are included in the corpus. Only one hit, normally from the original version text, was kept. In all, 62,394 valid observations were kept after the data cleaning procedure.

2.2 Metonymy identification

The 62,394 valid observations were then manually classified into different groups according to different senses of the "source expression" in the context, as illustrated in (1), namely: a. metonymic meanings with the target of WOMAN (N = 16,625); b. metonymic meanings with other targets (N = 7,062); c. non-metonymic meanings (e.g. literal meanings, pure metaphorical meanings) (N = 38,473); d. indeterminate meanings (N = 234).

(1) a. Metonymic meanings with the target WOMAN[2]
[青衣]导生去，入室，则九娘华烛凝待。 （清《聊斋志异》）
'The [green-clothes] (servant girls) guided the young scholar to the room; Jiu-Niang was waiting for him in the light of candles.'
(Qing *Strange Tales of Liao-Zhai*)

[翠袖]多情，[红颜]薄命。 （清《梵林绮语录三种》）
'[Green sleeves] (beautiful women) have an amorous nature; [red faces] (beautiful women) suffer unhappy fates.'
(Qing *Three Novels of Fan Lin Qi*)

2 All examples in this paper are from the CHC. The translations are provided by the first author of the present paper. For conventional notations, the square brackets [] indicate the source/literal readings of expressions; the round brackets () indicate the metonymic readings in contexts.

b. Metonymic meanings with other targets
两班[青衣]按时奏乐。 (清《红楼梦》)
'Two groups of [green-clothes] (musicians) started playing music on time.'
(Qing *A Dream of Red Mansions*)

是时宋太宗在位既久，未立[东宫]。 (清《杨家将》)
'By that time Song Taizong has been on the throne for a long time, but he has not designated the [eastern palace] (crown prince).'
(Qing *Warriors of the Yang Clan*)

c. Non-metonymic meanings
literal meaning
有[青衣]仙女数十人... (明《周朝秘史》)
'There are dozens of fairies in [green clothes]...'
(Ming *The Secret History of the Zhou*)
pure metaphorical meaning
万点[胭脂]遮[翠袖]，谁识黄昏凝伫。 (宋《全宋词》)
'Thousands of [blusher] (red flowers) conceals the [green sleeves] (green leaves); who knows they stand for a long while with steady gaze at twilight.'
(Song *The Complete Ci-Poetry of Song*)

d. Indeterminate meanings
玉勒留将久，[青楼]梦不成。 (唐《全唐诗》)
'The jade gag-bit (metonymically, horse) will stand up, while I cannot dream of the [green house] (luxury mansion/imperial palace/beautiful woman, etc.).'
(Tang *The Complete Poetry of Tang*)

Adopting a modified MIP procedure (Pragglejaz Group 2007; Steen et al. 2010), the procedure for meaning identification employed in this case study includes the following steps. First, we read the entire sentence to establish a general understanding of the meaning. For the "source expression" in the text, we established its meaning in context, that is, how it applies to an entity, relation, or attribute in the situation evoked by the text. Second, for each "source expression", we determined its basic meaning, i.e. the literal meaning registered in the DCMS, the DCSW and the *Great Chinese Dictionary* (Lou 1993). Third, we decided whether the contextual meaning of the expression contrasts with the basic meaning but has a contiguous relationship with it. We consulted the DCMS and the DCSW for potential contiguous relationship candidates, such as a contiguous relationship between BODYPART and PERSON, between CLOTHING and PERSON, etc. Finally, if the outcome was positive, we marked the expression as metonymic; if not, we marked the expression as non-metonymic, i.e. group c.

Then we noted the metonymic target for the metonymic case according to the contextual meaning. If the target is WOMAN, it was classified into group a.; and group b., otherwise. We also encountered some cases which have indeterminate contextual meanings, and those cases were classified into group d.

Only observations in group (1a) (i.e. with the target WOMAN) were selected for the diachronic study. In a number of cases we encountered multiple metonymies for the target category in one expression. For instance, in example (2a) two specific metonymic mappings are identified, i.e. DRESS FOR WOMAN and HAIRPIN FOR WOMAN, and in (2b) two metonymic mappings of SCARF FOR WOMAN and HEADGEAR FOR WOMAN are found. There are good reasons to treat 裙钗 *qun-chai* "dress-hairpin" and 巾帼 *jin-guo* "scarf-headgear" as expressions with coordinative metonymic mappings. In *qun-chai*, the two constituents trigger the same metonymic target by different source concepts, i.e. CLOTHES vs. ACCESSORY. For *jin-guo*, although both of the two constituents literally refer to a kind of accessory made of gauze fabric, their referents have different shapes and functions: GUO has no fixed shape and it is used as a headwear by noble women, while JIN is used as a headwear by ordinary women (Lin 1995: 33).

(2) a. 若许[裙钗]应科举，女儿那见逊公卿。 （明《今古奇观》）
'If [dress-hairpin] (women) are allowed to take the imperial examinations, they are not necessarily inferior to men.'
(Ming *The Spectacles in Ancient and Modern Times*)

b. 只为藩王谋不轨，却教[巾帼]压须眉。 （民国《汉代宫廷艳史》）
'Only because the seignior was up to no good, the beard-eyebrows (metonymically, men) were suppressed by the [scarf-headgear] (women).'
(Republic of China *The Romantic Records of Han Palace*)

To determine the presence of different metonymic mappings within one expression, we subjected all compound expressions in the dataset to an analysis in terms of the 'prismatic' model for the semantics of composite expressions (Geeraerts 2002). The prismatic model systematically distinguishes between semantic mappings on the level of the components of a compound expression and mappings on the composite level. Thus, it allows us to tackle the problem of how the components construct the literal meaning of the compound expression as a whole, and at the same time it shows the correspondence between the components and their conceptual equivalents in the derived figurative meaning. Taking into account such multiple metonymies in a single expression, a total of 17,629 metonymic mappings for WOMAN were identified. Table 2 shows the total number of observations before and after the prismatic analysis.

For each mapping, the metonymic source, target and pattern were coded. Take 青衣 *qing-yi* "green-clothes" and 红颜 *hong-yan* "red face" in (1a) as examples. For the

Table 2: Frequencies of metonymies for WOMAN collected from the CHC.[3]

Before the prismatic analysis	After the prismatic analysis
249 expressions (e.g. 裙钗 *qun-chai* dress-hairpin)	226 metonymic items (e.g. 裙 *qun* dress, 钗 *chai* hairpin)
16,625 instances (e.g. 若许[裙钗]应科举 If [dress-hairpin] are allowed to take the imperial examinations…)	17,629 metonymic mappings (e.g. DRESS FOR WOMAN, HAIRPIN FOR WOMAN)

former, we coded CLOTHES as the source, SERVANT GIRL as the target, and PIECE OF CLOTHING FOR PERSON as the pattern; for the latter, BODYPART, BEAUTIFUL WOMAN and BODYPART FOR WHOLE were identified as the source, target and pattern respectively. In total, targets identified in the 17,629 metonymic mappings were classified into 11 groups under the general target category WOMAN: SERVANT GIRL (`srvg`, $N = 5{,}016$), BEAUTIFUL WOMAN (`btfw`, $N = 4{,}010$), WIFE/CONCUBINE (`wfcn`, $N = 3{,}394$), IMPERIAL WOMAN (i.e. female members of the imperial family such as queen, queen mother, princess, imperial concubine) (`impw`, $N = 2{,}062$), A WOMAN (`woman`, $N = 840$), YOUNG WOMAN (`ygw`, $N = 809$), MOTHER/GRANDMOTHER (`mthrg`, $N = 599$), RICH WOMAN (`richw`, $N = 411$), UNCHASTE WOMAN (e.g. prostitutes and mistress) (`unchaste`, $N = 399$), FEMALE ENTERTAINER (e.g. singing girls and dancing girls) (`fment`, $N = 83$) and OTHERS (`other`, $N = 6$).

3 Exploring and visualizing the diachronic changes

To achieve a visualization of the changes in the metonymical expressions, we carried out a multidimensional scaling analysis on a profile-based distance calculation, and further used the results of the multidimensional scaling analysis for drawing diachronic pathways. The successive steps are the following.

3 Three points need to be highlighted to have better understanding of the table. First, a few metonymy candidates selected from the dictionaries have no valid hits in the CHC. Hence, only 249 expressions are found with instances before the prismatic analysis. Second, for most coordinate compounds (Chao 1968; Ceccagno and Basciano 2009: 481), which have both constituents as heads or no head at all and the two constituents of which have the same weight in indicating the meaning of the compound as a whole like the English expression *bittersweet*, we simply divided them into two parts and checked the metonymic process on both constitutes. It is common that different compounds may share the same constituent, therefore without replication count, only 226 unique metonymic items are found after the prismatic analysis. Third, as mentioned above, multiple metonymic mappings may happen in one expression, hence the number of metonymic mappings is reasonably higher than the number of instances retrieved from the corpus.

3.1 Step 1 Profile-based distance calculation

The database consisting of source, target, and pattern triplets allows for the identification of onomasiological variation. For instance, we might notice that in a given time period, a given target concept is metonymically referred to predominantly by means of a term in the pattern BODYPART FOR WHOLE, and secondarily by means of another expression in the pattern LOCATION FOR LOCATED. Such onomasiological variation can be subjected to the profile-based distance calculation that was introduced by Geeraerts et al. (1999) as a generic method for measuring linguistic uniformity in onomasiological studies. In our case, a *profile* (more precisely, a *metonymic profile*) for a particular target in a certain time period is the set of alternative metonymic patterns used to designate that target in that time period, together with their relative frequencies. Measuring the distance between the metonymic profile in one time period and the metonymic profile in the next then allows us to identify changes in the metonymical conceptualization of the target. The basic assumption is that if there is no diachronic variation in metonymic patterns for a certain target, the profiles for that target in different time periods (e.g. `btfw_01PrQH`, `btfw_02STF`, `btfw_03Song`) should be similar, or in other words, the profile-based distance between the periods is minimal. All the metonymic mappings collected from the corpus were included in the analysis, with the exception of the target OTHER[4] ($N = 6$), i.e. a total of 17,623 metonymic mappings with *ten* specific target concepts (subcategories of WOMAN), was selected for data analysis. The main interest here is the diachronic variation in metonymic patterns for different targets, thus three main variables are involved in the data analysis, i.e. `target`, `pattern` and `time`.

To calculate the profile-based distances, we first collapsed the three variables into two, i.e. target-time combination (*TT*) and pattern (*P*). The target-time combination *TT* includes, for example, BEAUTIFUL WOMAN in the first time period (`btfw_01PrQH`), BEAUTIFUL WOMAN in the second time period (`btfw_02STF`), or WIFE/CONCUBINE in the third time period (`wfcn_03Song`), where each of these is represented by a specific profile made up of metonymic patterns and their relative frequencies. Table 3 illustrates the resulting dataset.

On the basis of this matrix, profile-based distances were calculated with the help of a *City Block Distance measurement* filtered by a *Log Likelihood Ratio Test* (Speelman, Grondelaers, and Geeraerts 2003; Ruette 2012: 66). The City-Block distance, i.e. D_{CB}, is a straightforward descriptive dissimilarity measure. However, only when the absolute frequencies in the profiles are large enough

4 The frequency of the target other ($N = 6$) is too low to explore the diachronic variation quantitatively.

Table 3: Metonymic profile of a target in each time period (absolute frequency).

Pattern / TT	ACTION FOR AGENT	ACTION FOR PATIENT	BODYPART FOR WHOLE	CHARACTERISTIC FOR PERSON	...	Pattern n
btfw_01PrQH	0	0	6	9		...
btfw_02STF	21	0	292	183		...
...	...	...	...	...	....	...
wfcn_02STF	13	10	0	6		...
wfcn_03Song	8	0	0	8		...
...	...	...	...	...	....	...
target-time$_k$	...	...	...	...	....	...

can the relative frequencies used in the *City-Block Distance* measurement be good estimates. Thus, as a supplementary approach the *Log Likelihood Ratio Test*, i.e. D_{LLR}, was adopted to test whether the distance measured by D_{CB} is actually a significant difference between the profiles, and not just a difference by chance. These two measurements are illustrated as follows.

Given a target-time combination TT_j, the absolute frequency F_{TT_j} of the usage of a pattern is:

$$F_{TT_j}(x_i) \tag{1}$$

where x_i represents a pattern listed in the column of Table 3. The initial data matrix (Table 3) is used as input to obtain a distance matrix, which then represents the dissimilarity among target-time combinations based on their profiles. The measure of D_{CB} is calculated based on the relative frequency R of the metonymic pattern x_i for the target-time combination TT_j, which is defined as:

$$R_{(TT_j)}(x_i) = \frac{F_{TT_j(x_i)}}{\sum_{k=1}^{n}\left(F_{(TT_j)}(x_k)\right)} \tag{2}$$

Then, we refer to the D_{CB} between two target-time combinations (e.g. TT_j, TT_k) on the basis of their metonymic profiles with:

$$D_{CB}(TT_j, TT_k) = \frac{1}{2}\sum_{(i=1)}^{n} |R_{(TT_j)(x_i)} - R_{(TT_k)(x_i)}| \tag{3}$$

where D_{CB} (TT_j, TT_k) measures the dissimilarity between target-time combination TT_j and TT_k (dividing by 2 is to normalize the results to the interval of [0,1]).

Unlike with the D_{CB}, which is calculated based on the relative frequencies, the *Log Likelihood Ratio Test* looks at the absolute frequencies in the compared profiles. Hence, the p-value returned by the *Log Likelihood Ratio Test* indicates

Table 4: The distance matrix based on D_{CB} filtered by D_{LLR} for the data in Table 3.

	btfw_01PrQH	btfw_02STF	…	wfcn_02STF	wfcn_03Song	…	target-time$_k$
btfw_01PrQH	0	0.38		0.98	0.97	…	…
btfw_02STF	0.38	0		0.94	0.93	…	…
…	…	…	…	…	…	…	…
wfcn_02STF	0.98	0.94		0	0	…	…
wfcn_03Song	0.97	0.93		0	0	…	…
…	…	…	…	…	…	…	…
target-time$_k$	…	…	…	…	…	…	0

how confident we are that the profiles differ. The p-value from the log likelihood ratio test was adopted as a filter for the D_{CB}: the distance we used was D_{CB} if the p-value returned by D_{LLR} was lower than 0.05, and zero otherwise. Table 4 represents the distance matrix based on D_{CB} filtered by D_{LLR} for the data in Table 3. Figure 1 displays the *cumulative distances* of each target in every two successive time periods. The plot only shows the overview variability across time for each target. To capture how a target actually varies chronologically in its metonymic patterns, the MDS solution was then carried out for a better visualization.

3.2 Step 2 Multidimensional scaling

The distance matrix (Table 4) was used as the input for a *Multidimensional Scaling* (MDS) analysis[5] to present the data structure in a low-dimensional

5 Technically, we adopted the Kruskal's Non-metric Multidimensional Scaling implemented in the function `isoMDS` from the `MASS` package (Venables and Ripley 2002) in R to do the dimension reduction. MDS is one of many dimension reduction techniques such as correspondence analysis (CA), factor analysis (FA), principal component analysis (PCA), etc. In general, PCA and FA are less useful in the context of count data, especially low frequency data, which is the case of the present study. CA is a good method for count data. As a descriptive technique, CA works on the Chi-square statistic and can be applied to tables whether or not the Chi-Square statistic is appropriate (Greenacre 2007). MDS works well for both measurement data and count data and we can choose to apply different distance measurements to obtain the input matrix of MDS. From a theoretical point of view, we chose City Block Distance measurement to create the distance matrix in this case. At the same time, we used Log Likelihood Ratio Test (LLR) to ensure that the D_{CB} is a good estimate of the dissimilarity. However, for a standard CA, it is hard to integrate the confirmatory test of LLR. Choosing D_{CB} filtered by D_{LLR} is also to follow up the method developed by Speelman, Grondelaers and Geeraerts (2003) for comparing language varieties. It is definitely worth trying CA and comparing the results from CA with from MDS in future research.

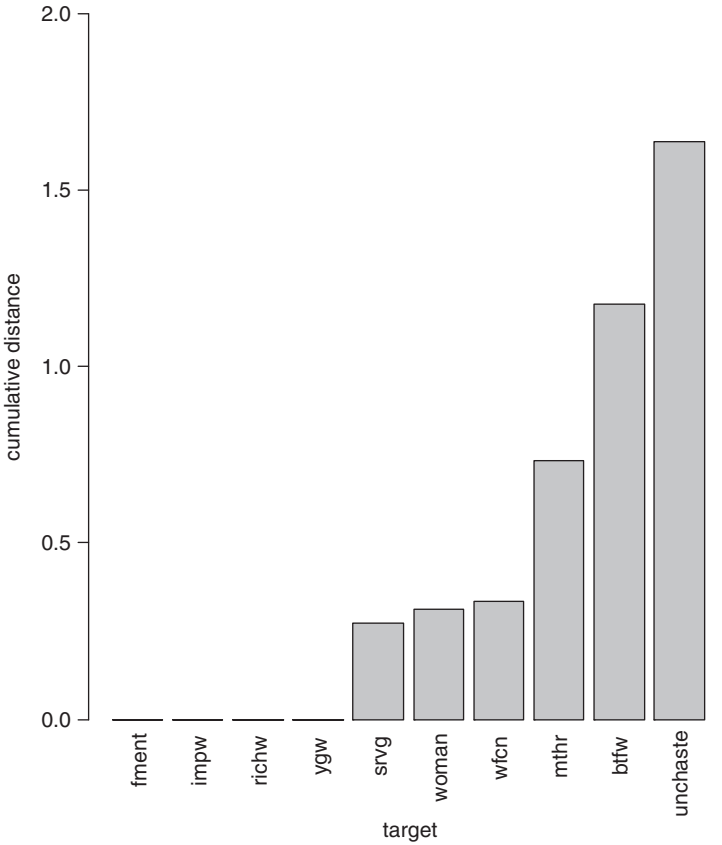

Figure 1: Cumulative distances (D_{CB} filtered by D_{LLR}) of different targets.

space in such a way that the distance in the low-dimensional map could represent the dissimilarities in the metonymic profiles. The MDS analysis has proved to be a powerful tool in linguistic research, especially in visualizations of language variation (see Hilpert 2011; Levshina 2011; Heylen et al. 2012; Ruette 2012). For the present study, the MDS suggests a three-dimensional solution with a stress value of 0.11, which means that approximately 11% of the variation in the distance matrix is not represented by the MDS solution.[6]

6 A point to emphasize is that MDS is a purely exploratory technique to explore the data and to find out the *potentially* interesting variation. The distance displayed in the MDS map may merely be an artificial output from the MDS algorithm instead of an exact representation of

The solution is displayed in Figure 2 with a 3D plot as well as separate plots for each combination of two dimensions. Each symbol in the plot represents a target in a certain time period, i.e. a target-time combination. The proximity of *TT*s to each other on the map indicates how (dis)similar they are in terms of metonymic profiles, i.e. the closer they are to one other, the more similarity of metonymic patterns they share.

The plot can be interpreted from two perspectives. On one hand, from a 'panchronic' perspective, if the group of symbols for the same target (e.g. `btfw`) from different time periods is situated at a considerable distance from the group of another target (e.g. `wfcn`), this generally indicates that these two targets (e.g. BEAUTIFUL WOMAN and WIFE/CONCUBINE) have quite different metonymic profiles. In other words, regardless of the different time periods, WIFE/CONCUBINE (`wfcn *`) seems to share less similarity of metonymic patterns with BEAUTIFUL WOMAN (`btfw o`) than with IMPERIAL WOMAN (`impw +`). On the other hand, from a diachronic perspective, variation in the metonymic patterns for a target across time is reflected by the distance between the successive target-time combinations for a given target, e.g. between `btfw_01PrQH` and `btfw_02STF` or between `wfcn_02STF` and `wfcn_03Song`.

3.3 Step 3 Interpretation of the MDS dimensions

To interpret the MDS dimensions, we need a way to recover the information of `pattern` distribution, from which the profile-based distances were calculated. Basically, the relative frequency of each pattern (i.e. $R_{TT_j}(x_i)$ in equation (2)) was plotted as the size of the symbol (TT_j) in the MDS map (cf. Tanimura et al. 2006). It should be noted that a target-time combination which has zero relative frequency of that pattern is still displayed in the map with the smallest size for a clearer comparison between different plots. This visualization method helps to uncover the dominant pattern location in the 3D space and then allows one to find out the patterns strongly associated with the MDS dimensions. Therefore, we shall interpret the dimensions based on the information from the variable `pattern`.

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the variation in the distance matrix. For instance, Figure 1 shows that the target YOUNG WOMAN (`ygw`) has no *cumulative distance* in the distance matrix (Note: for this target the distances from `02STF` to `06Qing` and from `04Yuan` to `06Qing` are 0.455 and 0.446 respectively), however, the symbols representing this target do not gather together in the MDS map. In other words, MDS may create distance which is not there in the distance matrix. One reason of the distortion might be due to the coarse-grained LLR test, which converts the distance into zero if the returned p-value > 0.05. But this distortion is specific to the targets with no cumulative distance in Figure 1. For those targets with big cumulative distances, it is easier for the MDS plot to yield a satisfactory solution and the MDS results are more trustworthy.

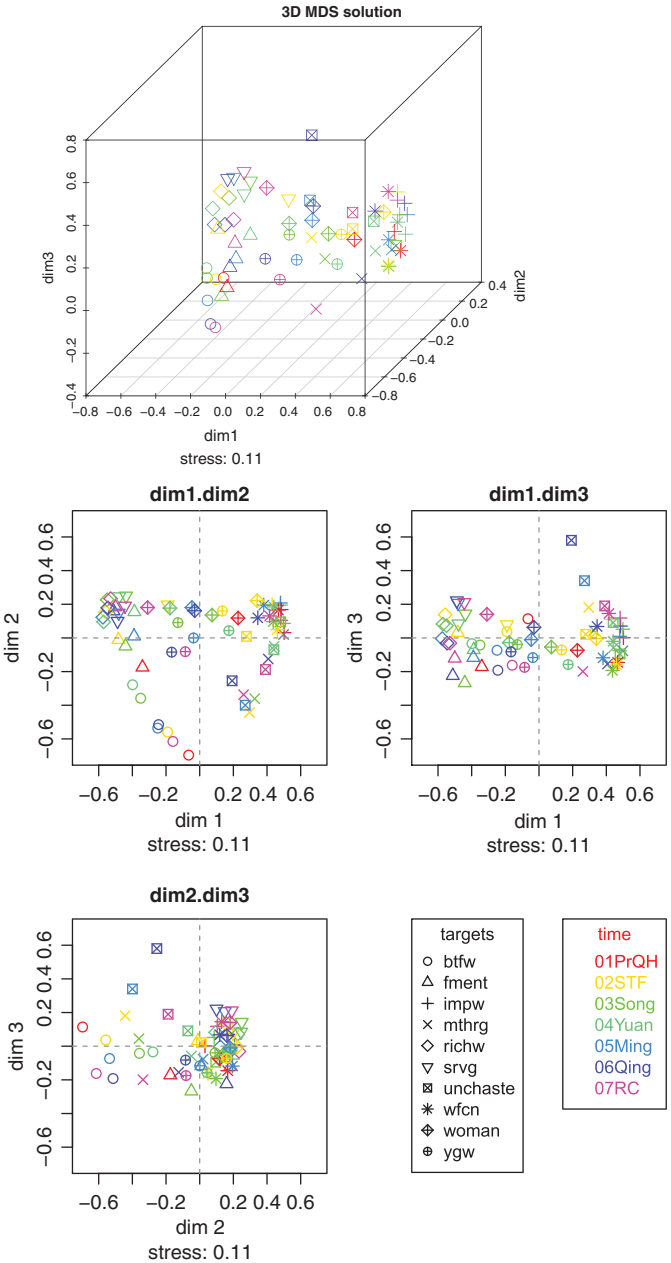


Figure 2: MDS maps representing the distances between the target-time combinations. Note: (dim1: dimension 1; dim2: dimension 2; dim3: dimension 3).

[Correction added after online publication 18 March 2015: $R_{TT_m}(x_i)$ and (TT_m) were changed into $R_{TT_j}(x_i)$ and (TT_j).]

Two patterns are taken as examples, i.e. PIECE OF CLOTHING FOR PERSON and LOCATION FOR LOCATED. Figure 3 indicates that on the first dimension, higher proportions of PIECE OF CLOTHING FOR PERSON (i.e. symbols with larger sizes) mainly locate at the negative side of the dimension, which shows that PIECE OF CLOTHING FOR PERSON contributes greatly on the first dimension of the MDS solution. Symbols of PIECE OF CLOTHING FOR PERSON with large sizes lean slightly towards the positive side along the second dimension. Along the third dimension, the larger symbols gather around the zero point on that dimension, indicating that PIECE OF CLOTHING FOR PERSON is not very distinctive on that dimension. For the pattern LOCATION FOR

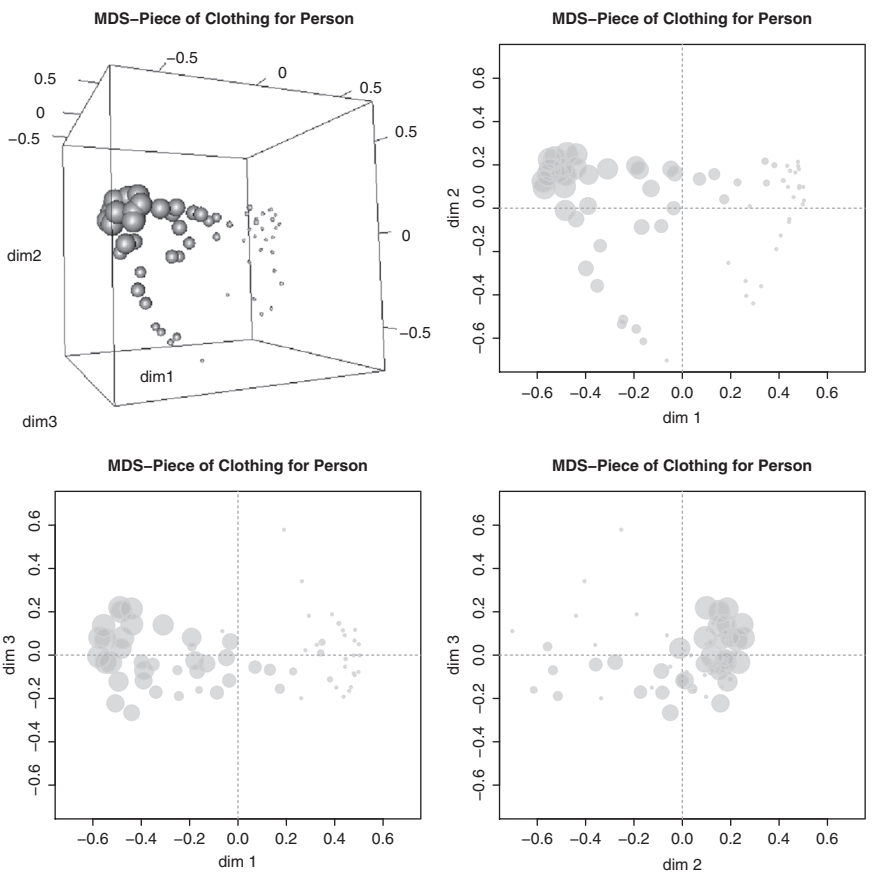


Figure 3: MDS maps with symbol sizes representing the proportion of PIECE OF CLOTHING FOR PERSON.

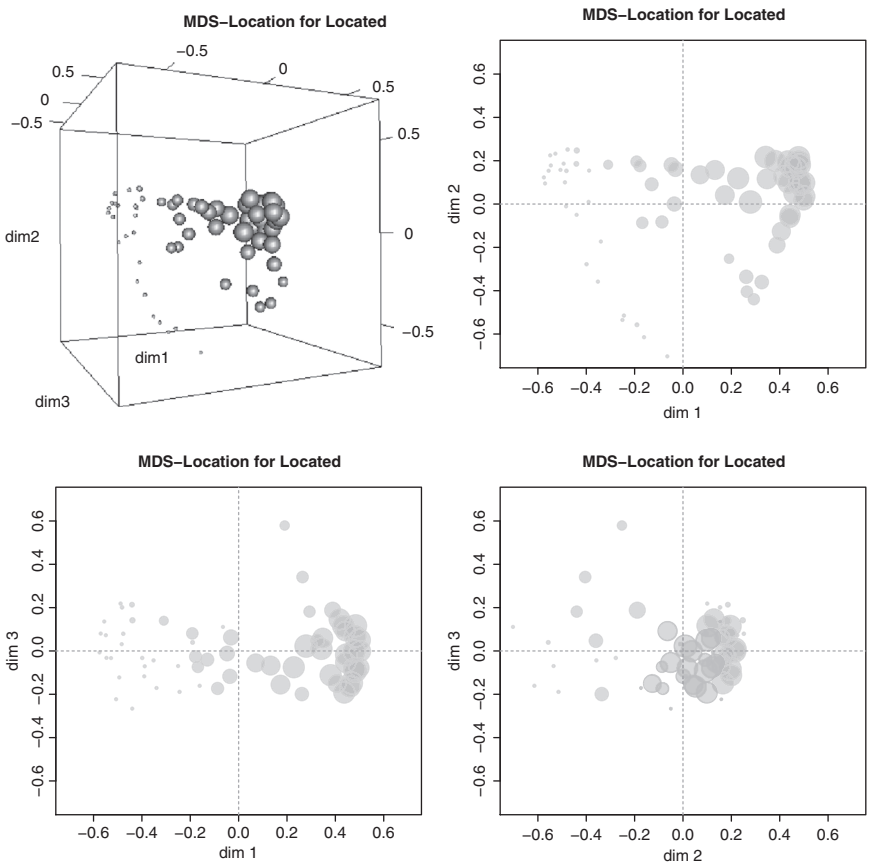


Figure 4: MDS maps with symbol sizes representing the proportion of LOCATION FOR LOCATED.

LOCATED (see Figure 4), the symbols with large sizes do not distribute along the third dimension, but one group of large-size symbols can be discerned at the positive side of both the first and the second dimensions. Therefore, both figures show that the first dimension of the MDS solution clearly splits the patterns PIECE OF CLOTHING FOR PERSON on its negative side and LOCATION FOR LOCATED on its positive side. At the same time, the patterns PIECE OF CLOTHING FOR PERSON and LOCATION FOR LOCATED to some extent contribute to the positive side of the second dimension.

For the other patterns, Appendix provides their MDS maps with symbol sizes representing the proportions of patterns. An overview of each pattern's contribution to the dimensions in the 3D space is summarized in Table 5, and Table 6 presents metonymic patterns positively and negatively ruling on three dimensions.

Table 5: Contributions of patterns on three dimensions.

Pattern	dim1	dim2	dim3
ACTION FOR AGENT	positive	negative	positive
ACTION FOR PATIENT	positive	slightly negative	around zero
BODYPART FOR WHOLE	around zero	negative	around zero
CHARACTERISTIC FOR PERSON	negative	negative	mainly negative
INSTRUMENT FOR AGENT	negative	mainly positive	negative
INSTRUMENT FOR PATIENT	positive	negative	positive
LOCATION FOR LOCATED	mainly positive	mainly positive	around zero
PIECE OF CLOTHING FOR PERSON	negative	mainly positive	around zero
POSSESSED FOR POSSESSOR	negative	negative	mainly negative

Table 6: Metonymic patterns positively and negatively ruling on three dimensions.

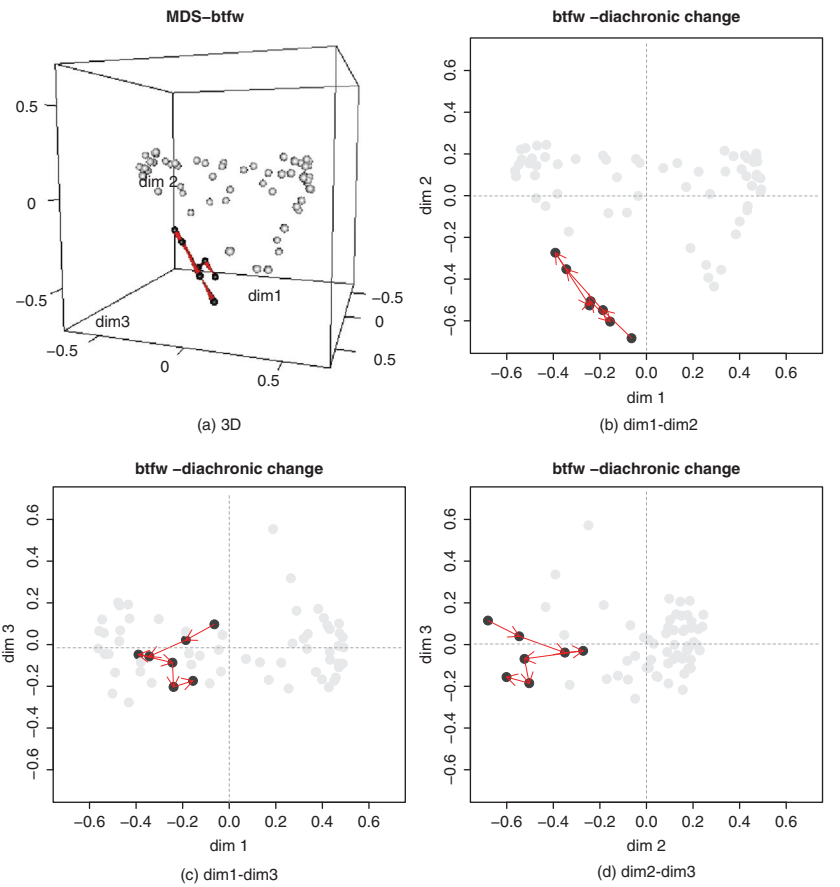
Dimension	Positive	Negative
dim 1	ACTION FOR AGENT	CHARACTERISTIC FOR PERSON
	ACTION FOR PATIENT	INSTRUMENT FOR AGENT
	INSTRUMENT FOR PATIENT	PIECE OF CLOTHING FOR PERSON
	LOCATION FOR LOCATED	POSSESSED FOR POSSESSOR
dim 2	INSTRUMENT FOR AGENT	ACTION FOR AGENT
	LOCATION FOR LOCATED	ACTION FOR PATIENT
	PIECE OF CLOTHING FOR PERSON	BODYPART FOR WHOLE
		CHARACTERISTIC FOR PERSON
		INSTRUMENT FOR PATIENT
		POSSESSED FOR POSSESSOR
dim 3	ACTION FOR AGENT	CHARACTERISTIC FOR PERSON
	INSTRUMENT FOR PATIENT	INSTRUMENT FOR AGENT
		POSSESSED FOR POSSESSOR

3.4 Step 4 Diachronic pathways

In order to visualize the diachronic change of pattern distribution for each target, arrows were added to the symbols with the same target in a chronological order, i.e. between every two successive time periods. Taking into account the dimension interpretation in Step 3, the trajectory of connected arrows in the 3D MDS space then represents the diachronic evolution of metonymic patterns for a given target. We should bear in mind that outliers in the MDS map have an error rate of 11% (stress = 11%), therefore the graphic

representation in the 3D space is just a rough indication of potential variation instead of an exact representation. To illustrate the analytic procedure, we may take the target BEAUTIFUL WOMAN as an example. In total, six metonymic patterns are identified for this target, i.e. ACTION FOR AGENT, BODYPART FOR WHOLE, CHARACTERISTIC FOR PERSON, LOCATION FOR LOCATED, PIECE OF CLOTHING FOR PERSON and POSSESSED FOR POSSESSOR.

Figure 5 displays the MDS solution for the diachronic changes of metonymic patterns for BEAUTIFUL WOMAN. It shows that following a diachronic order, the first four symbols move from the center to the negative side on the first dimension, from the negative side to the center on the second dimension, from the positive



(a) 3D (b) dim1-dim2 (c) dim1-dim3 (d) dim2-dim3

Figure 5: MDS maps of diachronic changes of metonymic patterns for BEAUTIFUL WOMAN.

side to the center at the third dimension, i.e. towards the left-top-center area[7] and then the last three symbols come back from the negative side to the center on the first dimension, from the center to the negative side at the second dimension, from the center to the negative side on the third dimension, i.e. towards the left-bottom-back corner in the 3D space. Consulting the dimension interpretation in Tables 5 and 6, we can now identify the following interesting variation based on the diachronic track in the 3D space.

First, the diachronic change with regard to the pattern PIECE OF CLOTHING FOR PERSON, which contributes to a high degree in the left-top-center area, for the target BEAUTIFUL WOMAN, can be seen from the plots: the proportion of PIECE OF CLOTHING FOR PERSON gradually increased from the second time period (no such pattern is found in `01PrQH`) to the fourth time period, and then decreased afterwards.

Second, the symbol representing the first time period is interesting to explore. It is located near the zero point at both the first and third dimensions, and on the negative side at the second dimension, where the pattern CHARACTERISTIC FOR PERSON dominates in the 3D space. It means that the pattern CHARACTERISTIC FOR PERSON takes a relatively higher proportion for BEAUTIFUL WOMAN in `01PrQH`.

Third, symbols coming back from the left-top-center area (where PIECE OF CLOTHING FOR PERSON dominates) to the left-bottom-back corner (where POSSESSED FOR POSSESSOR dominates) in the 3D space indicate that the pattern POSSESSED FOR POSSESSOR experienced a rise in the last three time periods.

Fourth, the third and fourth symbols are located farthest from the negative side of the second dimension (see Figure 5, plot d), where the pattern BODYPART FOR WHOLE makes an important contribution. This corresponds to the lower proportions of this pattern in the third and fourth time periods (`03Song` and `04Yuan`).

In short, two points should be highlighted for the interpretation of the MDS maps: first, the distance between two symbols for the same target in two successive time periods (e.g. `btfw_01PrQH` and `btfw_02STF`) reflects the degree to which the onomasiological profile of metonymic expressions for this target changes during the two time periods; second, the dimension interpretation helps us link the direction of arrow movement to the diachronic changes of metonymic patterns.

7 Several terms are used to label the different faces of the 3D space, i.e. *top, bottom, left, right, front*, and *back*. Without specific remarks, *left* and *right* correspond to the negative and positive sides of dim 1 respectively; *bottom* and *top* to the negative and positive sides of dim 2; *back* and *front* to the negative and positive sides of dim 3.

One important comment needs to be stated with respect to the interpretation of these diachronic pathways. It is possible to find multiple metonymic patterns that dominate the same location in the 3D space. For instance, POSSESSED FOR POSSESSOR and CHARACTERISTIC FOR PERSON have the same contributions on the three dimensions, i.e. both negatively dominate on three dimensions. When we find an interesting diachronic track of the last three symbols moving towards the left-bottom-back corner (see Figure 5), both patterns could be responsible for the shift. However, when we go back to the original data, it is easier to find out which pattern actually contributes to this change. The data show that the proportion of CHARACTERISTIC FOR PERSON fluctuates between 23.97% and 29.57% from `04Yuan` to `07RC` and reaches its highest point in `06Qing`. For POSSESSED FOR POSSESSOR, its proportion has the lowest point of 13.84% in `04Yuan`, but then rises constantly to 29.20% in `05Ming`, 30.09% in `06Qing` and 37.82% in `07RC`. Therefore, we can conclude that the trajectory moving back to the left-bottom-back corner is mainly due to the increasing proportion of the pattern POSSESSED FOR POSSESSOR.

In a word, to interpret the diachronic variation displayed in the MSD space correctly, one should combine three aspects:

- *the trajectory in the 3D space*: to show how a target changes across time
- *the dimension interpretation*: to link the diachronic change to the metonymic profiles of each target-time combination
- *the original data*: to figure out which metonymic pattern is responsible for the variation when multiple metonymic patterns share the similar dominant areas in the 3D space

4 Results and discussion

If we now try to classify the types of changes that we find in the data, three main kinds of diachronic pathways are displayed in the MDS plots: stable patterns of evolution, evolutions with a dominant trend, and highly fluctuating evolutions. The following subsections present these types in more detail, but due to space limitations, we will present only one target as an example for each type.

4.1 Targets with relatively stable diachronic variation – IMPERIAL WOMAN

In total, 2062 metonymic mappings with four different metonymic patterns are found for the target IMPERIAL WOMAN, see example (3). Three main sub-targets are

included: IMPERIAL CONCUBINE(S) (N = 1,325), QUEEN (N = 620) and QUEEN MOTHER (N = 117).

(3) a. ACTION FOR PATIENT
左传曰，桓公多[内宠]，有如夫人者六人。 （六朝《后汉书》）
'According to Zuo Zhuan, Emperor Heng had many [inner-favor] (imperial concubines); he has six concubines.'
(Six Dynasties *The Book of Later Han*)

b. BODYPART FOR WHOLE
入觐[慈颜]，乳母当然不能同往了。 （民国《清朝三百年艳史演义》）
'He entered the court to have an audience with the [kind face] (queen mother). Without a doubt, his nanny could not accompany him.'
(RC *Love Stories of Three Hundred Years in Qing Dynasty*)

c. LOCATION FOR LOCATED
二年，御史大夫赵绾请毋奏事[东宫]。 （汉《汉书》）
'In the second year, the Grand Censor Zhao Wan requested not to give a presentation to the [eastern palace] (queen mother).'
(Han *The History of the Han Dynasty*)

d. PIECE OF CLOTHING FOR PERSON
献琼杯于阙下，徙[青衣]于蜀路。
（唐《晋书》）
'Emperor Wen of Han was forced to hand over the jade cup in his palace; the [green clothes] (queen and imperial concubines) were forced to flee towards the State of Shu.'
(Tang *The Book of Jin*)

The MDS maps in Figure 6 indicate few diachronic changes: the symbols for IMPERIAL WOMAN in the seven different time periods gather together at the first and second dimensions; only minor random movements appear at the third dimension. The small distances among the symbols show that the choice of metonymic pattern for IMPERIAL WOMAN is quite stable across time. This finding is confirmed by the distributions displayed in Table 7: with a proportion of more than 85% in the first time period and more than 90% in the later six time periods, the pattern LOCATION FOR LOCATED is always preferred for this target. The majority of the lexical items in LOCATION FOR LOCATED literally refer to the general imperial palace or a particular palace, e.g. 西宫 *xi-gong* "western-palace", 中宫 *zhong-gong* "middle-palace", 长秋 *Chang Qiu*, 长信 *Chang Xin*.

From a cultural and historical point of view, it is no surprise that items in the lexical field of PALACE are dominant, stable metonymic sources for IMPERIAL WOMAN.

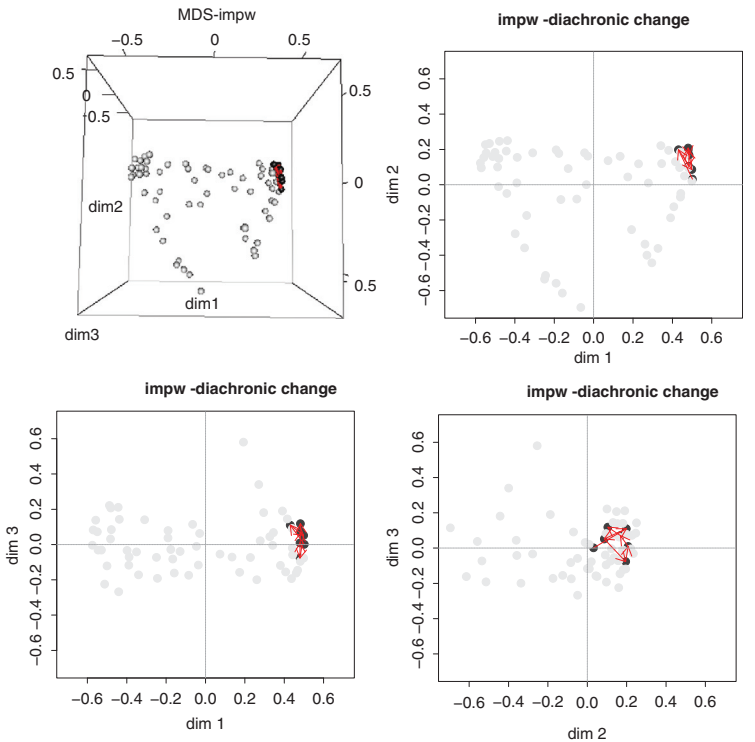


Figure 6: MDS maps of diachronic changes of metonymic patterns for IMPERIAL WOMAN.

First, in ancient China, activity spaces for imperial women were very restrained. Most of the time, imperial women should stay in their own palaces, which were not only their habitation but also the arena for most activities, as in [1]. Second, different imperial women were located in different palaces and they seldom moved between palaces so that the constant places could serve as a differential. Third, compared to body parts, clothing or personal characteristics, location (palace) is a relatively extrinsic attribute of a person and implies more conceptual distance to the target. This distant relationship between the source and the target may reflect the actual distance in terms of social status between the speaker and the person addressed, i.e. the imperial women. That is to say, a conceptual metaphorical similarity is established between the proximity in social status and the closeness between metonymic source and target. To show their respect to and to keep their distance from the queen or other imperial women, people tended to use a LOCATION FOR LOCATED metonymy. Up to a point, this could be interpreted as a special kind of euphemism in this case; as claimed in Allan and Burridge (2006:

Table 7: Metonymic pattern distributions for IMPERIAL WOMAN across time.

Pattern	01PrQH		02STF		03Song		04Yuan		05Ming		06Qing		07RC	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
ACTION FOR PATIENT	11	14.3	21	4.7	13	4.3	1	0.8	4	1.9	14	4.1	13	2.4
BODYPART FOR WHOLE	0	0	0	0	0	0	0	0	0	0	0	0	4	0.7
LOCATION FOR LOCATED	66	85.7	429	94.9	290	95.7	130	99.2	204	98.1	332	96.0	529	96.9
PIECE OF CLOTHING FOR PERSON	0	0	1	0.2	0	0	0	0	0	0	0	0	0	0
total	77	100	451	100	303	100	131	100	208	100	346	100	546	100

134), "special language is often used, both when communicating with rulers and when talking about them." It is interesting to underline that there are only four observations of the pattern BODYPART FOR WHOLE. They all use the term 慈颜 *ci-yan* "kind-face" for "queen mother", and all of them appear only in 07RC, in which the Republic of China was created and the monarchy was abolished. One may speculate that people then had more freedom to name the female members of the imperial family with a less extrinsic attribute than their habitual residence.

[1] 内有九室，九嫔居之；外有九室，九卿朝焉。《周礼•冬宫考工记》
'(The Imperial Palace has an inner part and an outer part.) The inner part (palace) has nine parts for imperial concubines on nice different levels to live; the outer part (front court) has nine parts for courtiers at nine different levels to have an audience with the emperor.'
(*Rites of Zhou: Office of Winter, Record of Trades*)

4.2 Targets with a dominant trend in the diachronic variation – A WOMAN

The target A WOMAN includes those cases with a general reference to a female person without a particular indication of being "a queen", "a servant girl" or other specific kinds of women. In other words, people may only infer that the text is about a woman instead of a man from the contextual clues. In total, 840 metonymic mappings are identified of this target with two metonymic patterns.

(4) a. LOCATION FOR LOCATED
听刘玉瓶要比武未免就要阻拦，说："你我总是[闺门]，....."
(清《彭公案》)
'Being told that Liu Yuping would go out for a flight contest, she could not help stopping her, saying, "after all, you and I are both [woman's bedroom] (women),..."'
(Qing *Judge Mr. Peng*)

b. PIECE OF CLOTHING FOR PERSON
[巾帼]须眉同一传，忠臣义妇共千秋。 (民国《明史演义》)
'The [scarf-headgear] (women) and the beard-eyebrows (men) should pass on from generation to generation; loyal officials and righteous women should together endure forever.'
(RC *The Romance of Ming Dynasty*)

Table 8 presents the frequencies of all metonymic patterns for A WOMAN across the different periods. A cross-linguistic study (Zhang 2013) shows that PIECE OF

Table 8: Metonymic pattern distributions for A WOMAN across time.

Pattern	01PrQH		02STF		03Song		04Yuan		05Ming		06Qing		07RC	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
LOCATION FOR LOCATED	9	90.00	47	92.16	24	66.67	14	31.82	35	46.05	207	48.36	34	17.26
PIECE OF CLOTHING FOR PERSON	1	10.00	4	7.84	12	33.33	30	68.18	41	53.95	220	51.64	163	82.74
total	10	100	51	100	36	100	44	100	76	100	426	100	197	100

CLOTHING and LOCATION are often frequently used as the metonymic sources in Chinese for PERSON in general. Heavily influenced by the Confucian *li* "rites", rigid clothing and residence systems had been established in the society as far back as Zhou Dynasty (1046–256 BC). Everybody lost flexibility in clothing as well as residence. According to the clothing and residence regulations, female and male never shared in terms of clothing types or locations, see quotations [2] and [3]. This specific cultural element provides a strong motivation for the metonymic link between a woman and her clothing or location.

[2] 外內不共井，不共湢浴，不通寢席，不通乞假，男女不通衣裳。
《礼记•内则》
'Outside or inside, they [male and female] should not go to the same well, nor to, the same bathing-house. They should not share the same mat in lying down; they should not ask or borrow anything from one another; *they should not wear similar upper or lower garments*.'
(*Book of Rites: The Pattern of the Family*)

[3] 男子居外，女子居內…… 男不入，女不出。 《礼记・内则》
'The men occupied the exterior; the women the interior... The men did not enter the interior; the women did not come out into the exterior.'
(*Book of Rites: The Pattern of the Family*)

So, does the preference for choosing CLOTHING or LOCATION as the metonymic source for referring to a woman change historically? The MDS solution (Figure 7) shows that although there is some minor oscillation along the first dimension, a dominant trend can be found towards its negative side, where PIECE OF CLOTHING FOR PERSON dominates. In the first three periods, proportions of LOCATION FOR LOCATED always take the first place with all proportions above 60% (their symbols are situated at the positive side of the first dimension). Since 04Yuan, PIECE OF CLOTHING FOR PERSON has replaced LOCATION FOR LOCATED with the largest share of all proportions, more than 50%. Most of the linguistic realizations of LOCATION FOR LOCATED are compounds formed with the item 闺 *gui*, which refers to "woman's room". The diminished shares of LOCATION FOR LOCATED in later time periods might show that the social constrains on women's location become less and women have more freedom in terms of activity areas in later periods than in early periods. A closer scrutiny of the data however indicates that the increasing usage of PIECE OF CLOTHING FOR PERSON in the later periods mainly lies in a drastic rise of using women's accessories as the metonymic source, especially in two coordinate compounds, i.e. 裙钗 *qun-chai* "skirt-hairpin" and 巾帼 *jin-guo* "scarf-headgear", see example (2). This diachronic change may reflect an

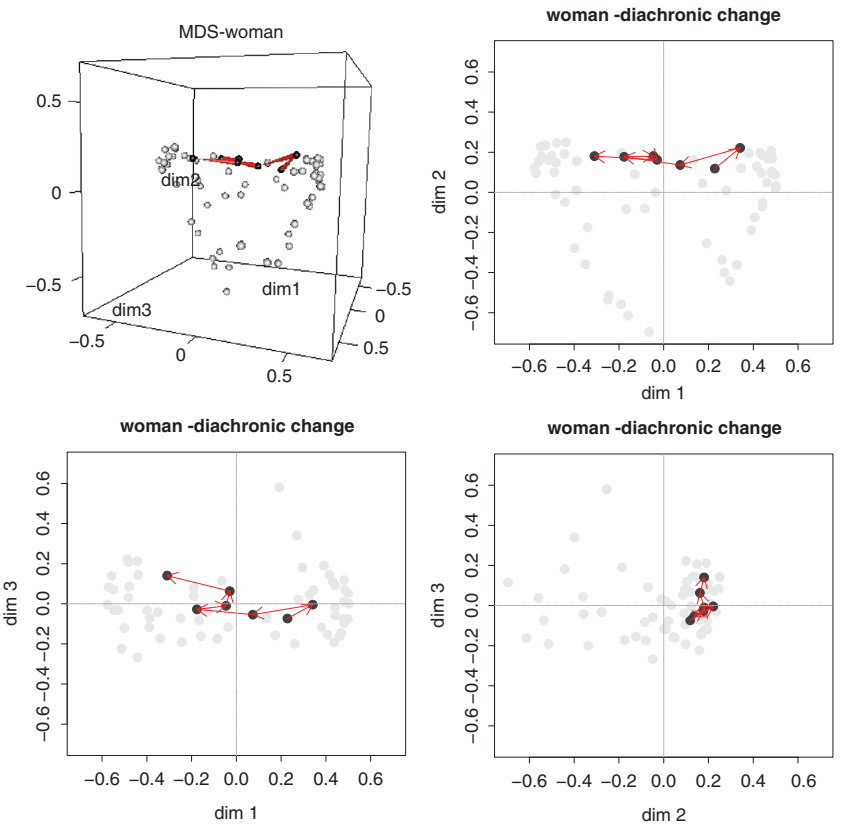


Figure 7: MDS maps of diachronic changes of metonymic patterns for A WOMAN.

increase in the material standards of living, or changing fashions, but more historical evidence would be needed to support this interpretation.

4.3 Targets with highly fluctuating diachronic variation– BEAUTIFUL WOMAN

In the corpus, there are 4,010 metonymic mappings for the target BEAUTIFUL WOMAN; they represent six metonymic patterns. Table 9 displays the frequencies of the different patterns for this target in the seven periods. We have briefly discussed the diachronic variation in patterns for BEAUTIFUL WOMAN in Step 4 of Section 3. Below we will give examples for each pattern (5). The MDS solution (Figure 5) shows that four patterns involve noticeable diachronic variation, i.e.

Table 9: Metonymic pattern distributions for BEAUTIFUL WOMAN across time.

Pattern	01PrQH		02STF		03Song		04Yuan		05Ming		06Qing		07RC	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
ACTION FOR AGENT	0	0	21	2.71	49	5.10	2	0.41	9	2.19	24	3.11	12	2.02
BODYPART FOR WHOLE	6	40	295	38.11	164	17.08	75	15.50	99	24.09	150	19.46	152	25.55
CHARACTERISTIC FOR PERSON	9	60	183	23.64	264	27.50	116	23.97	112	27.25	228	29.57	152	25.55
LOCATION FOR LOCATED	0	0	11	1.42	2	0.21	2	0.41	0	0	2	0.26	1	0.17
PIECE OF CLOTHING FOR PERSON	0	0	121	15.63	333	34.69	222	45.87	71	17.27	135	17.51	53	8.91
POSSESSED FOR POSSESSOR	0	0	143	18.48	148	15.42	67	13.84	120	29.20	232	30.09	225	37.82
total	15	100	774	100	960	100	484	100	411	100	771	100	595	100

CHARACTERISTIC FOR PERSON, PIECE OF CLOTHING FOR PERSON, POSSESSED FOR POSSESSOR and BODYPART FOR WHOLE.

(5) a. ACTION FOR AGENT
[倾国]三年别，烟霞一路遥。 （唐《全唐诗》）
'Parting with the [to ruin state] (beautiful woman) three years ago; mist and clouds in the twilight are far away.'
(Tang *The Complete Poetry of Tang*)

b. BODYPART FOR WHOLE
[青蛾][皓齿]在楼船，横笛短箫悲远天。 （唐《全唐诗》）
'[Black eyebrows] [white teeth] (beautiful women) are on the elegant boat; the melancholy sound of flutes and pipes are going away.'
(Tang *The Complete Poetry of Tang*)

c. CHARACTERISTIC FOR PERSON
哀[窈窕]而不淫其色，思贤才而不伤乎善。 （汉《天禄阁外史》）
'Cherish [gentle and graceful] (beautiful women) but do not indulge in their beauty; long for virtuous talents but do not slander their goodness.'
(Han *History of Tian Lu Tower*)

d. LOCATION FOR LOCATED
[金闺]潇洒转伤嗟，莲步轻移呼侍妾。 （元《全元曲•散曲》）
'The [a laudatory name for a woman's bedroom] (beautiful woman) was light-hearted and then sighed sadly; she moved in mincing and beautiful steps to call a servant girl.'
(Yuan *The Complete Qui-Poetry of Yuan: Lyric Verses*)

e. PIECE OF CLOTHING FOR PERSON
我则见两个乔人，引定个[红裙]，蓦入堂门..... （元《全元曲•杂剧》）
'Then I saw two ruffians lead a [red skirt] (beautiful woman) to enter the hall suddenly.'
(Yuan *The Complete Qui-Poetry of Yuan: Poetic Drama*)

f. POSSESSED FOR POSSESSOR
万两黄金难买命，一朝[红粉]已成灰。 （明《玉堂春落难逢夫》）
'Ten thousand liang (a unit of weight) gold cannot buy a life; [blusher and powder] (beautiful women) would turn into ashes one day.'
(Ming *Yutangchuan Met Her Husband with Misfortune*)

In the first period (01PrQH), CHARACTERISTIC FOR PERSON is dominant. Observations under PIECE OF CLOTHING FOR PERSON first appear in 02STF and experience a rise and

then a fall with the highest percentage of 45.96% in 04Yuan and the lowest percentage of 8.91% in 07RC. Three main sources are included under this pattern, i.e. ACCESSORY, CLOTHES and HAIRSTYLE (6). In addition, the proportion of POSSESSED FOR POSSESSOR, which conceptually construes a beautiful woman by her cosmetics (7), has a consistent increase in the last three periods. The BODYPART FOR WHOLE pattern is popular in the first two periods with proportions above 38%. Later, especially in 03Song and 04Yuan, BODYPART FOR WHOLE is underused.

(6) a. ACCESSORY
室贮[金钗]十二，门迎朱履三千。 （清《康熙侠义传》）
'Twelve [gold hairpins] (beautiful women) are settled at home; three thousands of pearly shoes (metonymically, retainers) are outside the gate.'
(Qing *Kang Xi Knight-Errantry Biography*)

b. CLOTHES
切不可到了富贵之时，忘记了小女，另娶[红妆]。（清《薛刚反唐》）
'You must never forget my daughter and marry another [red dress] (beautiful woman) when you are rich.'
(Qing *Xue Gang To Rebel*)

c. HAIRSTYLE
算从来、司空惯，断肠初对[云鬟]。 （宋《全宋词》）
'It is no surprise to see all along that a heartbroken man meet a [circular hairstyle] (beautiful woman) for the first time.'
(Song *The Complete Ci-Poetry of Song*)

(7) a. 六宫[粉黛]足如花，丑女无盐敢自夸。（清《东周列国志》）
'The [powder and umber black dye] (beautiful women) in the six palaces all look like flowers. However, the ugly woman Wu Yan is here to boast herself.'
(Qing *Romance of the States of Eastern Zhou*)

b. [红粉]不知愁，将军意未休。 （清《红楼梦》）
'The [blusher and powder] (beautiful woman) does not know the meaning of sadness; the general hasn't made up his mind yet.'
(Qing *A Dream of Red Mansions*)

The diachronic variation found for the target BEAUTIFUL WOMAN is in accordance with the findings of Chen in his masterpiece *The History of Women's Life in China* (Chen 1937). Chen studies the historical change of the Chinese appreciation of

female beauty. He finds that the Chinese ideal of female beauty historically went through an evolution from unaffected physical beauty to artificial decorative beauty (Chen 1937: 77–79). This change of aesthetic judgment started in Han dynasty, which is the last dynasty of 01PrQH, and then the new ideal became established in Six Dynasties, which is the first dynasty of 02STF. This social-cultural change affects the language in the sense that in the first two time periods, when economy and materials were underdeveloped, people had a preference for choosing internal and intrinsic attributes, i.e. CHARACTERISTIC and BODYPART, to designate a beautiful woman. With the progress of society, in the later time period, the society became rich in material wealth, and then people started to use external attributes, i.e. CLOTHING (CLOTHES, ACCESSORY and HAIRSTYLE) and POSSESSED PROPERTY (COSMETICS), to refer to a beautiful woman. Furthermore, we should notice that the metonymic links of CLOTHING/POSSESSED PROPERTY and BEAUTIFUL WOMAN became entrenched much later than the social-cultural change.

5 Conclusions

The main findings of our exploration of diachronic variation in metonymic patterns for WOMAN in Chinese may be summarized in the following points.

First, a strong association between metonymic patterns and targets is found in the MDS solution of the data (see Figure 2). Generally speaking, symbols representing the same target cluster relatively closer to each other than symbols representing different targets in the MDS map, which indicates that although all the targets belong to the same general category, i.e. WOMAN, people tend to use different metonymic patterns to designate them. This finding also corresponds to the basic cognitive assumption regarding metonymy, i.e. that salient aspect/attributes tend to be chosen as the source (cf. Langacker 1993: 30). Different kinds of women vary in their salient attribute, and therefore, the preferred pattern varies from one to another. At the same time, different subcategories of WOMAN display different degrees of variation. We have found targets with a relatively stable diachronic pattern (e.g., IMPERIAL WOMAN), targets with a dominant trend in diachronic variation (e.g., A WOMAN), and targets with much fluctuating historical variation (e.g., BEAUTIFUL WOMAN).

Second, the relative stability on the metonymic pattern level does not imply a similar stability on the source level or even the lexical level. The schematicity in metonymies (Feyaerts 1999) should be taken into consideration when we deal with the diachronic variation in the metonymic conceptualization of certain targets. For example, for the target IMPERIAL WOMAN, although in all time periods

LOCATION FOR LOCATED is the preferred pattern, we cannot draw the conclusion that the specific linguistic expressions instantiating this pattern are stable across time.

Last but not least, the data provide clues for the cultural and social basis of the metonymic conceptualization of WOMAN. As we have shown, historical changes in culture can be identified as the probable cause of some of the diachronic changes in the metonymic conceptualization of certain targets. For instance, the shift of ideal feminine beauty from intrinsic attributes to external decorative attributes results in a change in the metonymic patterns for BEAUTIFUL WOMAN. Admittedly, we cannot trace back all the diachronic variation found in the corpus to a definite motivation. A multitude of factors may influence the diachronic variation in metonymic patterns for WOMAN. Specifically also, since there is a strong correlation between text styles/genres and historical periods in the history of Chinese literature (Chu 1990; Yuan 2005), the interaction of the factors 'genre' and 'time' in our dataset should not be ignored. However, a separate analysis is needed to address this question (see Zhang 2013).

Theoretically, the empirical findings support the idea that metonymy is not only a physiologically embodied mechanism, but also a culturally-historically-socially contextualized concept. The usage of metonymy is not only a universal cognitive operation, but it is also sensitive to historical and cultural variation.

Methodologically, this study demonstrates the relevance of quantitative analyses of historical data. Specifically, an innovative method for visualizing diachronic changes in metonymies has been suggested. Visualization is done with the help of a Multidimensional Scaling solution based on a profile-based distance calculation and drawing diachronic trajectories in a set of MDS maps, corresponding to different target concepts. The diachronic trajectory then shows the metonymic pattern development of that target over time. In contrast with diachronic pathway representations with a semasiological orientation (Hilpert 2011), our visualization method crucially embodies an onomasiological perspective: the unit of variation is the set of metonymic patterns used to refer to a given target in a given period, differentiated by their relative frequencies. Diachronic shifts occur when these relative frequencies change significantly over time. We believe that this implementation of an onomasiological perspective has an important potential for diachronic cognitive semantics: an extension to changes in the relative prominence of metaphorical patterns may be readily envisaged, just like an extension, more generally, to the relative importance of literal, metonymic, or metaphorical expressions for a given target. The visualization technique, then, is a powerful and promising instrument for charting, in

Cognitive Linguistic terms, diachronic differences in the *construal* of given target concepts we are interested in.

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Appendix: MDS maps with symbol sizes representing the proportions of the pattern

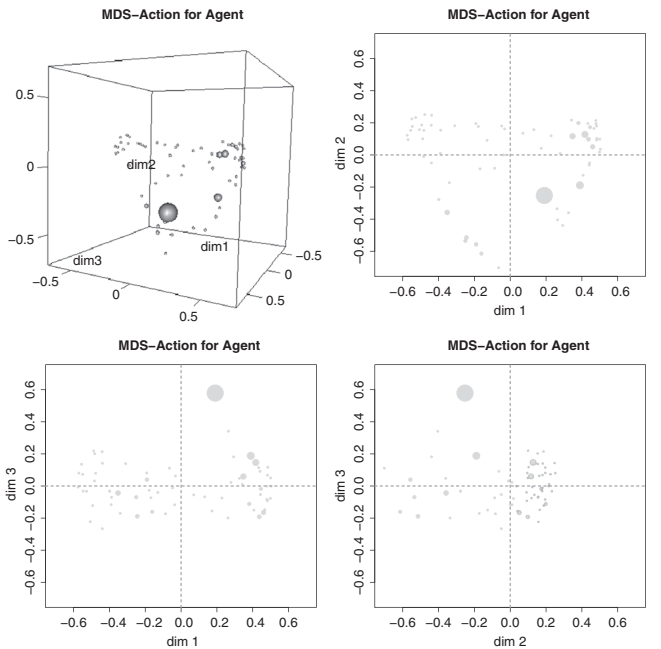

Figure 8: MDS maps with symbol sizes representing the proportion of ACTION FOR AGENT.

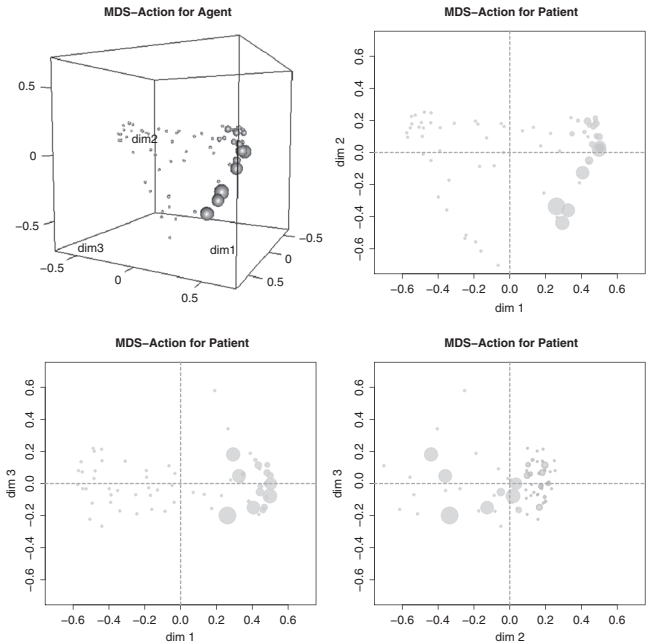

Figure 9: MDS maps with symbol sizes representing the proportion of ACTION FOR PATIENT.

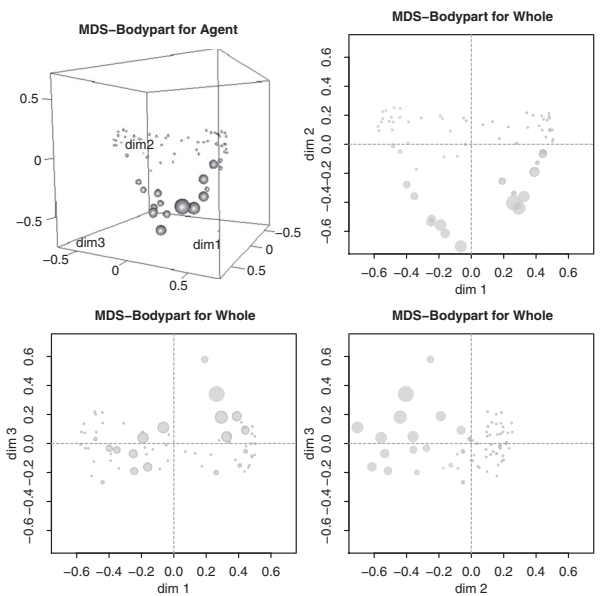

Figure 10: MDS maps with symbol sizes representing the proportion of BODYPART FOR WHOLE.

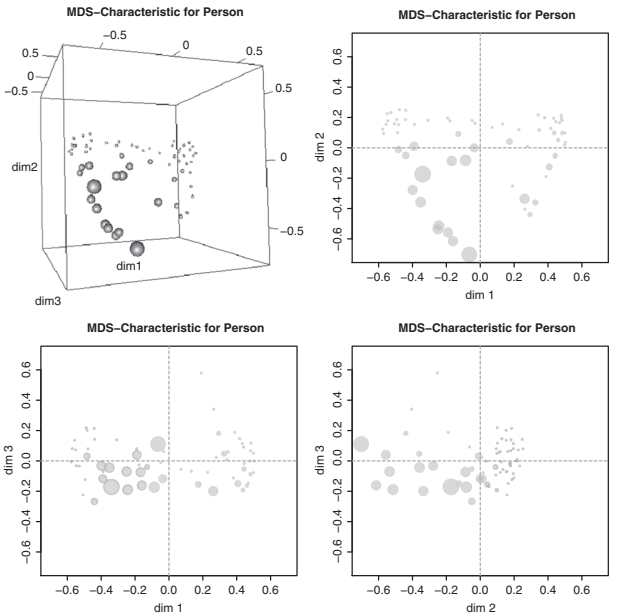

Figure 11: MDS maps with symbol sizes representing the proportion of CHARACTERISTIC FOR PERSON.

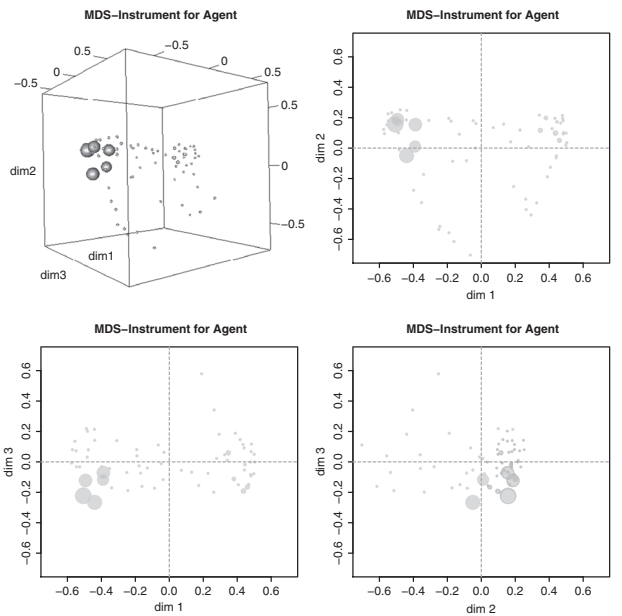

Figure 12: MDS maps with symbol sizes representing the proportion of INSTRUMENT FOR AGENT.

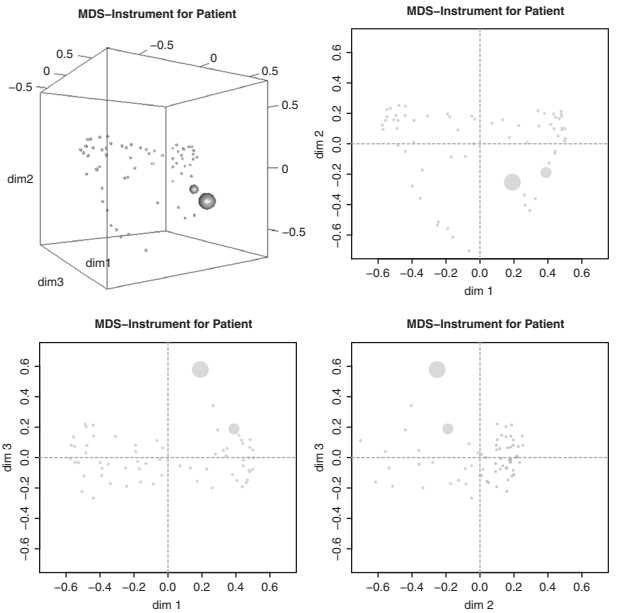

Figure 13: MDS maps with symbol sizes representing the proportion of INSTRUMENT FOR PATIENT.

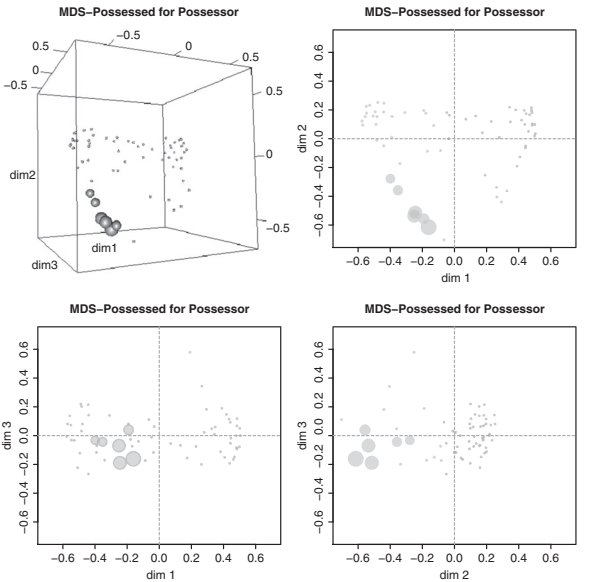

Figure 14: MDS maps with symbol sizes representing the proportion of POSSESSED FOR POSSESSOR.